

ARROWROCK DAM OUTLET WORKS REHABILITATION ENDANGERED
SPECIES MONITORING AND MITIGATION PROJECT

Compilation of monthly summaries for radio telemetry investigations for listed bull trout
(*Salvelinus confluentus*), Boise, Idaho
2004

Written by

Tammy Salow, Fisheries Biologist, U.S. Bureau of Reclamation, Snake River Area
Office West. 230 Collins Road. Boise, Idaho 83702. (208) 383-2216,
tsalow@pn.usbr.gov

TABLE OF CONTENTS

Monthly and bi-monthly summaries:

Mid-January.....	1
End of January.....	7
Mid-February.....	10
End of February.....	14
End of March.....	17
End of April.....	20
End of May.....	24

Mid-January Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 12/25/03 through 1/14/04)

Five radio tags from the 2002 fall tagging project remain in active, live fish. Since the beginning of the 2003 construction project, 55 radio-tagged tagged have entered the reservoir area downstream of Willow Creek campground.

No fish were confirmed mortalities during this reporting period (this is the second period without reported mortalities). We had some trouble locating our fish through the ice and snow and traveling to some of the locations on the ground. One fish remains missing from below Anderson Ranch dam, inferring either tag failure or poaching. This has occurred in previous years in the roaded South Fork area, an area highly used by anglers and osprey.

We had minimal movement this period. Three fish have moved into the residual pool of Arrowrock, all from the South Fork Boise River below Anderson Ranch dam. No new fish have become entrained through Arrowrock dam during this period.

Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, three fish have become entrained from the 2003 tagged sample (1-44, 5-192, 6-148). The entrainment rate for 2003 remains at 5.3 %. This is an increase from an entrainment rate of 3% for 2002 at the same time last year. We did not locate any of entrained fish this period: 1-44 (we expect this fish has been killed as its mortality sensor was triggered in late November and the fish did not move after that time), fish 5-192, and fish 6-148. Rising reservoir levels combined with ice and snow cover hamper radio signal reception.

Bull Trout in Arrowrock Reservoir (area normally inundated at full pool)

We tracked 30 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

Upper end of Arrowrock reservoir, from Willow Creek campground to Trail Creek – 1 radio tag (fish 5-190). This area is normally not inundated at this time of year.

There is a cobble bottom with pools riffles and runs providing habitat structure and cover for fish. Fish 5-190 moved from upstream of Twin Springs Resort to an area just upstream of Trail Creek prior to 12/22. This fish has remained upstream from Trail creek in an area that has several large pools that may provide cover and shelter from river icing. Since 12/22 this area has received 2-3 feet of snow and the river has a lot of shelf and anchor ice.

Irish Creek campground area, from Trail Creek to the South Fork Confluence- No radio tags. This section of the reservoir basin is inundated in October of a normal water year. This area of the river consists of a shifting sand channel with shallow water and minimal structure to provide fish cover. Most of the fish that we have found killed have been located in this area, and bald eagles are consistently observed hunting throughout this area during our surveys.

South Fork Confluence to the reservoir pool – no radio tags. This river section consists of shifting sand/clay substrate and fast moving, variable depth water. Two fish moved through this area to the residual pool. Bald eagles are consistently observed hunting in this area as well.

Reservoir Pool – 20 radio tags (1-49, 1-168, 2-1, 2-4, 2-7, 2-63, 2-71, 2-177, 5-164, 5-178, 5-180, 5-184, 5-187, 5-188, 5-189, 5-191, 5-199, 5-200, 6-146, 2-72). Fish have been moving actively in the reservoir, between the deep section of the residual pool immediately in front of Arrowrock dam to the mouth of Cinch Creek. Fish codes 5-164 and 5-184 moved downstream from the South Fork to the residual pool prior to 1/6. Fish code 3-9 was not found during this period, but had been found in the residual pool in later December. The residual pool is covered with ice and snow Cinch Creek to the dam (Figure 1).



Figure 1. The pool was ice and snow covered from Cinch Creek to the dam on 12/30/03 and 1/6/04.

South Fork Boise River –9 radio tags (1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 5-197). Fish in the South Fork continue to be actively moving within the river. Fish codes 5-164 moved 13.5 km downstream from near Willow Creek on the South Fork to the residual pool between 12/22 and 1/6. Fish 5-184 moved 27 km downstream from near Smith creek on the South Fork to the South Fork Gulch on

12/30 then to the residual pool prior to 1/6. Fish 1-47 and 2-5 are the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19. We have been unable to ground track the roaded areas of the South Fork due to adverse weather and poor road conditions during this period.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 4 radio tags (5-166, 5-182, 5-195, 6-142). Three fish remain alive and moving in the Middle and North Fork Boise Rivers upstream of Willow Creek campground. These are some of the smaller fish that were radio tagged in 2003, with total lengths ranging from 258 mm to 364 mm (mean = 324.4, s = 42.6). One fish in the North Fork Boise River has not moved from Meadow Creek since three weeks post tagging (5-182). We presume this fish must have been killed as it is a large fish (TL = 498), but cannot access the site as it is neither trailed nor roaded. One fish has completely disappeared after being tagged. It was never located after it was tagged indicating tag failure or poaching (fish 5-179).

Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

Summary of the fate of all radio tagged bull trout (radios with battery life extending at least one year)

In 2002 and 2003, we have tagged a total of 102 bull trout with radios tags having a battery life extending through at least one year. Of the fifty fish tagged in 2002, eleven were killed during the fall migration in 2002. Thirty fish survived through July, 2003 to begin the migration into river or headwater habitats. Of these fish, 22 actually made it to summer and spawning habitats, two fish never migrated, and two were entrained. Thirteen of the fish that migrated did not spawn and nine did (entered known spawning habitat during the spawning period). Only five fish tagged in 2002 are still alive with active radios and two radios have had their batteries expire in live fish.

Of the 52 fish tagged in 2003, two have become entrained (total of three fish entrained, but one fish that was entrained has a tag expected to expire in February) and twenty-two fish have been killed during the downstream migration to Arrowrock reservoir or the South Fork Boise River. We currently have 38 radio tags left in live fish, one tag expired, four tags are due to expire in February, two fish are missing, and two fish are entrained into Lucky Peak reservoir.

Projected work through January

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week and taking aerial reference photos. We plan hold project coordination meetings for the 2004 field season in the third week of January. Additional pictures are attached in Figures 2-4 showing conditions in the Boise Basin during this period.



Figure 2. Snow pack along the South Fork Boise River.



Figure 3. South Fork confluence 1/06/04



Figure 4. Elk unsuccessful at crossing Lucky Peak Reservoir.

End of January Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 1/14/04 through 1/30/04)

Five radio tags from the 2002 fall tagging project remain in active, live fish. Since the beginning of the 2003 construction project, 55 radio-tagged tagged have entered the reservoir area downstream of Willow Creek campground.

No fish were confirmed mortalities during this reporting period (this is the third period without reported mortalities). We continue to have some trouble locating our fish through the ice and snow and traveling to some of the locations on the ground. One fish remains missing from below Anderson Ranch dam, inferring either tag failure or poaching. This has occurred in previous years in the roaded South Fork area, an area highly used by anglers and osprey.

We had minimal movement this period. No new fish have become entrained through Arrowrock dam during this period.

Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, three fish have become entrained from the 2003 tagged sample (1-44, 5-192, 6-148). The entrainment rate for 2003 remains at 5.3 %. This is an increase from an entrainment rate of 3% for 2002 at the same time last year. We did not locate any of entrained fish this period: 1-44 (we expect this fish has been killed as its mortality sensor was triggered in late November and the fish did not move after that time), fish 5-192, and fish 6-148. Rising reservoir levels combined with ice and snow cover hamper radio signal reception. Three of our smaller radio tags are due to expire this week or next week. One of them is an entrained fish (6-148), one is in the residual pool (6-146) and one is a possible mortality in the Middle Fork Boise River upstream from Twin Springs (6-142).

Bull Trout in Arrowrock Reservoir (area normally inundated at full pool)

We tracked 29 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

Upper end of Arrowrock reservoir, from Willow Creek campground to Trail Creek – 1 radio tag (fish 5-190). This area is normally not inundated at this time of year. There is a cobble bottom with pools riffles and runs providing habitat structure and cover for fish. Fish 5-190 moved from upstream of Twin Springs Resort to an area just upstream of Trail Creek prior to 12/22. This fish has remained upstream from Trail creek in an area that has several large pools that may provide cover and shelter from river icing. Since 12/22 this area has received 2-3 feet of snow and the river has a lot of shelf and anchor ice. This area was a popular holding spot for several fish during the downstream migration.

Irish Creek campground area, from Trail Creek to the South Fork Confluence- No radio tags. This section of the reservoir basin is inundated in October of a normal water year.

South Fork Confluence to the reservoir pool – no radio tags. This river section consists of shifting sand/clay substrate and fast moving, variable depth water. Two fish moved through this area to the residual pool. Bald eagles are consistently observed hunting in this area as well.

Reservoir Pool – 19 radio tags (1-49, 1-168, 2-1, 2-4, 2-7, 2-63, 2-71, 2-177, 5-178, 5-180, 5-184, 5-187, 5-188, 5-189, 5-191, 5-199, 5-200, 6-146). Fish have been moving actively in the reservoir, between the deep section of the residual pool immediately in front of Arrowrock dam to the mouth of Cinch Creek. Fish codes 3-9, 2-72, and 5-164 were not found during this period, but had been found in the residual pool in early January. Fish code 3-9 has not been found for five weeks, however we suspect that this tag may have a weak battery or may have been trimmed as it has had a weak signal since implantation. The area has received substantial precipitation (snow) during this period. The residual pool still has some ice and snow (Figure 1).



Figure 1. Snow and ice near the residual pool 1/26/04.

South Fork Boise River –9 radio tags (1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 5-197). Fish in the South Fork continue to be actively moving within the river. Fish 1-47 and 2-5 are the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19. We were unable to ground track the roaded area of the South Fork on 1/27/04 and check on two of three fish that have not been moving much. We were able to disturb them and validate that they are alive and just inactive.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 4 radio tags (5-166, 5-182, 5-195, 6-142). Three fish remain alive and moving in the Middle and North Fork Boise Rivers upstream of Willow Creek campground. These are some of the smaller fish that were radio tagged in 2003, with total lengths ranging from 258 mm to 364 mm (mean = 324.4, s = 42.6). One fish in the North Fork Boise River has not moved from Meadow Creek since three weeks post tagging (5-182). We presume this fish must have been killed as it is a large fish (TL = 498), but cannot access the site as it is neither trailed nor roaded. One fish has completely disappeared after being tagged. It was never located after it was tagged indicating tag failure or poaching (fish 5-179). We have not been able to validate mortality for fish 6-142. It is in unusually fast water for holding, but near cover. We have not been able to get visual validation and will try again this next week.

Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

Projected work into February

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week and taking aerial reference photos. Boise and Deadwood project planning meetings were held on 1/21/04, and we have a busy year ahead of us. We will be working on completing summary reports and our 2004 permit application during February. Trap and haul from Lucky Peak reservoir is planned to start April 5.

Mid-February Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 1/31/04 through 2/17/04)

Five radio tags from the 2002 fall tagging project remain in active, live fish. Fifty-five radio-tagged tagged have entered the reservoir area downstream of Willow Creek campground since the beginning of the 2003 construction project.

No fish were confirmed mortalities during this reporting period (this is the fourth period without reported mortalities). We continue to have some trouble locating our fish through the ice and snow and traveling to some of the locations on the ground. One fish remains missing from below Anderson Ranch dam, inferring either tag failure or poaching. This has occurred in previous years in the roaded South Fork area, an area highly used by anglers and osprey.

We had minimal movement over the last couple of weeks and no new fish have become entrained through Arrowrock dam.

Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, three fish have become entrained from the 2003 tagged sample (1-44, 5-192, 6-148). The entrainment rate for 2003 remains at 5.3 %. This is an increase from an entrainment rate of 3% for 2002 at the same time last year. We did not locate any of entrained fish this period: 1-44 (we expect this fish has been killed as its mortality sensor was triggered in late November and the fish did not move after that time), fish 5-192, and fish 6-148. Rising reservoir levels combined with ice and snow cover hamper radio signal reception. We did hear one fish on channel 3, but were unable to get it to code. There is one fish missing in Lucky Peak on this channel, fish 3-81. We have not seen this fish since July 2003. Though we did track Mores Creek, it is possible the fish sought refuge in Grimes or above where we tracked during the summer. We need to confirm the presence of this animal in order to speculate on his over-summer refuge. Our three smaller radio tags that are due to expire this week or next week continue to transmit. One of them is an entrained fish (6-148) and was not found this period. The other fish both moved significantly this period. Fish 6-142 moved over one mile downstream from its previous holding area. Fish 6-146, in the residual pool, moved from directly in front of the dam to near Grouse Creek. All of the residual pool fish have moved upstream slightly during this period to a small section of open water near Grouse Creek.

Bull Trout in Arrowrock Reservoir (area normally inundated at full pool)

We tracked 29 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

Upper end of Arrowrock reservoir, from Willow Creek campground to Trail Creek – 1 radio tag (fish 5-190). This area is normally not inundated at this time of year. There is a cobble bottom with pools riffles and runs providing habitat structure and cover for fish. Fish 5-190 moved from upstream of Twin Springs Resort to an area just upstream of Trail Creek prior to 12/22. This fish has moves from an area just upstream from Trail creek to an area just downstream of Lambing Creek.

This is an area that has several large pools that may provide cover and shelter from river icing. Since 12/22 this area has received 2-3 feet of snow and the river has a lot of shelf and anchor ice. This area was a popular holding spot for several fish during the downstream migration during the fall.

Irish Creek campground area, from Trail Creek to the South Fork Confluence- No radio tags. This section of the reservoir basin is inundated in October of a normal water year.

South Fork Confluence to the reservoir pool – no radio tags. This river section consists of shifting sand/clay substrate and fast moving, variable depth water. Very little predator activity has been observed lately, many of the eagles that were consistently observed hunting through December appear to have moved out of this area.

Reservoir Pool – 19 radio tags (1-49, 1-168, 2-1, 2-4, 2-7, 2-63, 2-71, 2-177, 5-178, 5-180, 5-184, 5-187, 5-188, 5-189, 5-191, 5-199, 5-200, 6-146, 5-164). Fish have been moving actively in the reservoir, between the deep section of the residual pool immediately in front of Arrowrock dam to the mouth of Cinch Creek. Fish codes 3-9, and 2-72 were not found during this period, but had been found in the residual pool in early January. Fish code 3-9 has not been found for seven weeks, however we suspect that this tag may have a weak battery or may have been trimmed as it has had a weak signal since implantation. The area has received substantial precipitation (snow) during this period. The residual pool still has a lot of ice and snow, with only a small area of open water near the mouth of Grouse Creek where fish appear to be holding (Figure 1).



Figure 1. Snow and ice near the residual pool 2/10/04. Green circle indicates area of open water where fish have been moving.

South Fork Boise River – 9 radio tags (1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 5-197). Fish in the South Fork continue to be actively moving within the river. Fish 1-47 and 2-5 are the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 4 radio tags (5-166, 5-182, 5-195, 6-142). Three fish remain alive and moving in the Middle and North Fork Boise Rivers upstream of Willow Creek campground. These are some of the smaller fish that were radio tagged in 2003, with total lengths ranging from 258 mm to 364 mm (mean = 324.4, s = 42.6). One fish in the North Fork Boise River has not moved from Meadow Creek since three weeks post tagging (5-182). We presume this fish must have been killed as it is a large fish (TL = 498), but cannot access the site as it is neither trailed nor roaded. One fish has completely disappeared after being tagged. It was never located after it was tagged indicating tag failure or poaching (fish 5-179). We were able to validate mortality for fish 6-142, it moved over one mile downstream from its previous holding area.

Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

Projected work through the end of February

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week and taking aerial reference photos. The construction work on the dam is due for completion by March 1. We hope to release an interim report for the first 18 months of telemetry work on that date as well. We will be working on completing summary reports and our 2004 permit application during February, submitting the 2004 permit application also on March 1. Trap and haul from Lucky Peak reservoir is planned to start April 5.

End of February Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 2/18/04 through 2/29/04)

Five radio tags from the 2002 fall tagging project remain in active, live fish. Fifty-five radio-tagged fish have entered the reservoir area downstream of Willow Creek campground since the beginning of the 2003 construction project.

No fish were confirmed mortalities during this reporting period (this is the fifth period without reported mortalities). Warming temperatures and increased precipitation have caused increased inflows and fish activity in the residual pool. Though the upstream valve work is complete and the trash racks are in place and have been tested, the contractor continues to set the guides to the valves on the upstream side of the dam. As this work is completed, the water levels will be increased accordingly. However, to maintain water levels, discharge from the dam has exceeded 51 m³/s (1800 ft³/s) consequently entraining two new fish over the last two weeks.

One fish remains missing from below Anderson Ranch dam, inferring either tag failure or poaching. This has occurred in previous years in the roaded South Fork area, an area highly used by anglers and osprey.

Bull Trout in Lucky Peak Reservoir (entrainment)

Two new fish were entrained during this period. Overall, five fish have become entrained from the 2003 tagged sample (1-44, 5-192, 6-148, 5-187, 5-164). The entrainment rate for 2003 increased to 8.7 %. This is an increase from an entrainment rate of 4.2 % for 2002 at the same time last year. We did not locate three of the five entrained fish this period: 1-44 (we expect this fish has been killed as its mortality sensor was triggered in late November and the fish did not move after that time), fish 5-192, and fish 6-148. We expect the battery has expired on the tag for fish 6-148. The other two fish remain near the spilling basin of Arrowrock in Lucky Peak reservoir.

Bull Trout in Arrowrock Reservoir (area normally inundated at full pool)

We tracked 29 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

Upper end of Arrowrock reservoir, from Willow Creek campground to Trail Creek – 1 radio tag (fish 5-190). This area is normally not inundated at this time of year.

There is a cobble bottom with pools riffles and runs providing habitat structure and cover for fish. This fish has moved from an area just upstream from Trail creek to an area just downstream of Lambing Creek. This is an area that has several large pools that may provide cover and shelter from river icing. This area was a popular holding spot for several fish during the downstream migration during the fall and prior to the start of the 2003 spring migration.

Irish Creek campground area, from Trail Creek to the South Fork Confluence- No radio tags. This section of the reservoir basin is inundated by September of a normal water year.

South Fork Confluence to the reservoir pool – no radio tags. This river section consists of shifting sand/clay substrate and fast moving, variable depth water. Very little predator activity has been observed lately; many of the eagles that were consistently observed hunting through December appear to have moved out of this area.

Reservoir Pool – 18 radio tags (1-49, 1-168, 2-1, 2-4, 2-7, 2-63, 2-71, 2-177, 5-178, 5-180, 5-184, 5-188, 5-189, 5-191, 5-199, 5-200, 6-146.). Fish have been moving actively in the reservoir, between the deep section of the residual pool immediately in front of Arrowrock dam to the mouth of Cinch Creek. Fish code 3-9 was not found during this period. This fish has not been found for eleven weeks, however we suspect that this tag may have a weak battery or may have failed as it has had a weak signal since implantation. Fish codes 5-164 and 5-187 were entrained into Lucky Peak during this period. The area continued to receive substantial precipitation (rain and snow). Much of the ice on the residual pool has melted or collected on the downstream area just in front of the dam and there is a substantial amount of open water (Figure 1).



Figure 1. Arrowrock residual pool 2/24/04.

South Fork Boise River –9 radio tags (1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 5-197). Fish in the South Fork continue to be actively moving within the river. Fish 1-47 and 2-5 are the farthest upstream just below Anderson Ranch dam. Fish 1-48

has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 4 radio tags (5-166, 5-182, 5-195, 6-142). Three fish remain alive and moving in the Middle and North Fork Boise Rivers upstream of Willow Creek campground. These are some of the smaller fish that were radio tagged in 2003, with total lengths ranging from 258 mm to 364 mm (mean = 324.4, s = 42.6). One fish in the North Fork Boise River has not moved from Meadow Creek since three weeks post tagging (5-182). We presume this fish must have been killed as it is a large fish (TL = 498), but cannot access the site as it is neither trailed nor roaded. One fish has completely disappeared after being tagged. It was never located after it was tagged, indicating tag failure or poaching (fish 5-179). We were able to validate that fish 6-142 is alive and well as it moved over one mile downstream from its previous holding area before the battery expired in its radio tag.

Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

Projected work into March

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week and taking aerial reference photos as the reservoir begins to fill. We will be working on completing summary reports and developing a website where this information can be requested and obtained in either electronic or hard copy formats. We will return to a monthly reporting frequency on March 1, 2004. We will begin trapping bull trout entrained into Lucky Peak reservoir and moving them to Arrowrock reservoir on April 5.

End of March Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 3/1/04 through 3/31/04)

No fish were confirmed mortalities during this reporting period. The upstream valve work on Arrowrock dam is complete and the reservoir began to refill on March 1, 2004. The releases from the dam were reduced and water levels have been increasing accordingly (Figure 1).

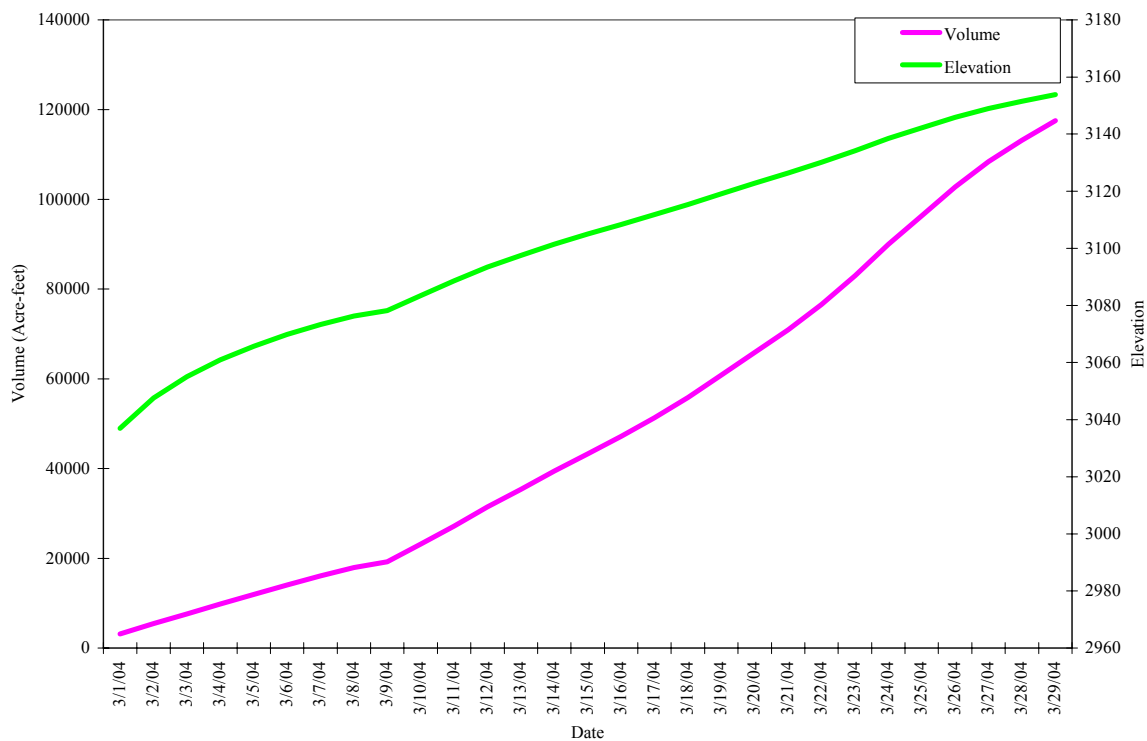


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of March 2004.

The radio tagged bull trout became very active during the month of March as temperatures warmed and stream flows have increased. Several fish followed the reservoir water line as it filled and five fish are in the Middle Fork Boise River upstream of Arrowrock Reservoir. One fish is at the North Fork Boise River confluence. Six fish left the residual pool and moved into the South Fork Boise River as the reservoir volume increased.

One fish remains missing from below Anderson Ranch dam, inferring either tag failure or poaching. This has occurred in previous years in the roaded South Fork area, an area highly used by anglers and osprey.

Bull Trout in Lucky Peak Reservoir (entrainment)

One new fish was entrained during this period. Overall, seven fish have become entrained from the 2003 tagged sample (six large and one small fish; 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for 2003 increased to 11.3 % for large

fish and 12.3 % for all fish tagged in 2003. This is an increase from an entrainment rate of 4.2 % for all fish and 4.8% for all fish tagged in 2002 at the same time last year. We did not locate two of the six entrained fish this period: 1-44 (we expect this fish has been killed as its mortality sensor was triggered in late November and the fish did not move after that time) and fish 6-148. The battery has expired on the tag for fish 6-148. The five fish that were found have been actively moving throughout Lucky Peak Reservoir, using the mouths of Charcoal and Mores creeks and Browns Gulch.

Bull Trout in Arrowrock Reservoir (now inundated, currently

We tracked 21 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

Upper end of Arrowrock reservoir, from Willow Creek campground to Trail Creek – 4 radio tags (5-180, 5-189, 2-7, 5-190). This area is just recently becoming inundated as the reservoir pool rises. Four fish have moved from the residual pool to an area upstream of Lambing Creek and slightly below Willow Creek. This is an area that has several large pools that may provide cover and shelter from extreme variations in stream flow that can occur during spring run-off. This was an important holding area during both the downstream and upstream migrations in 2003 and appears to remain so in 2004. We did have angler take occurring in this area near the beginning of June in 2003 where several radio tags were found in or adjacent to Willow Creek campground.

Irish Creek campground area, from Trail Creek to the South Fork Confluence- No radio tags. This section of the reservoir basin became inundated at reservoir elevation 3100 ft. around mid-March (comparison in Figure 2).



Figure 2. Irish Creek area on October 15, 2003 and on March 22, 2004

South Fork Confluence to the reservoir pool – no radio tags. This area filled quickly and was inundated within the first week of March.

Reservoir Pool – two radio tags (5-191, 5-199) Fish have been moving actively out of the reservoir as the water elevation rises. Fish code 3-9 was not found during this period. This fish has not been found for fifteen weeks, however we suspect that this tag may have a weak battery or may have failed as it has had a weak signal since implantation. Fish code 1-49 was entrained into Lucky Peak during the night on the last day of February. The area did receive some precipitation later in the month and both temperature and stream flows have increased through the month of March.

South Fork Boise River –15 radio tags (2-71, 5-184, 2-72, 5-199, 2-177, 2-63, 1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 5-197). Fish in the South Fork continue to be actively moving within the river. Six fish moved from the residual pool into areas in the South Fork during the month of March. Fish 1-47 and 2-5 continue to be the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19. We conducted snorkel validation for three fish that have not been very active this month. All three fish were disturbed and moved downstream or visually identified.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 3 radio tags (5-182, 5-195, 1-168). One fish had moved from the reservoir pool to the confluence of the Middle and North Fork Boise Rivers upstream of Willow Creek campground. Two fish in the North Fork Boise River has not moved from Meadow Creek since three weeks post tagging (5-182, 5-95). We presume one of these fish must have been killed as it is a large fish (TL = 498), but cannot access the site as it is neither trailed nor roaded. One fish has completely disappeared after being tagged. It was never located after it was tagged, indicating tag failure or poaching (fish 5-179). All of the small NTC tags have expired though we expect that the fish were all alive when the tags expired as they were actively moving and generally small fish.

Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

Projected work into April

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week. We will begin trapping bull trout entrained into Lucky Peak reservoir and moving them to Arrowrock reservoir on April 5.

End of April Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 4/1/04 through 4/30/04)

No fish were confirmed mortalities during this reporting period. The upstream valve work on Arrowrock dam is complete and the reservoir continued to refill through mid-April. Around mid-month, releases from Arrowrock dam were increased to provide irrigation water and begin filling Lucky Peak for recreation. March was one of the driest and warmest months on record, yielding conditions that substantially reduced our snow pack and water levels. The Boise and Payette projects are currently at 74% of their capacity, the overall system is at around 65% of its normal water levels for this time of year, so far spring run-off has been low. Consequently water levels in Arrowrock have been declining through April (Figure 1).

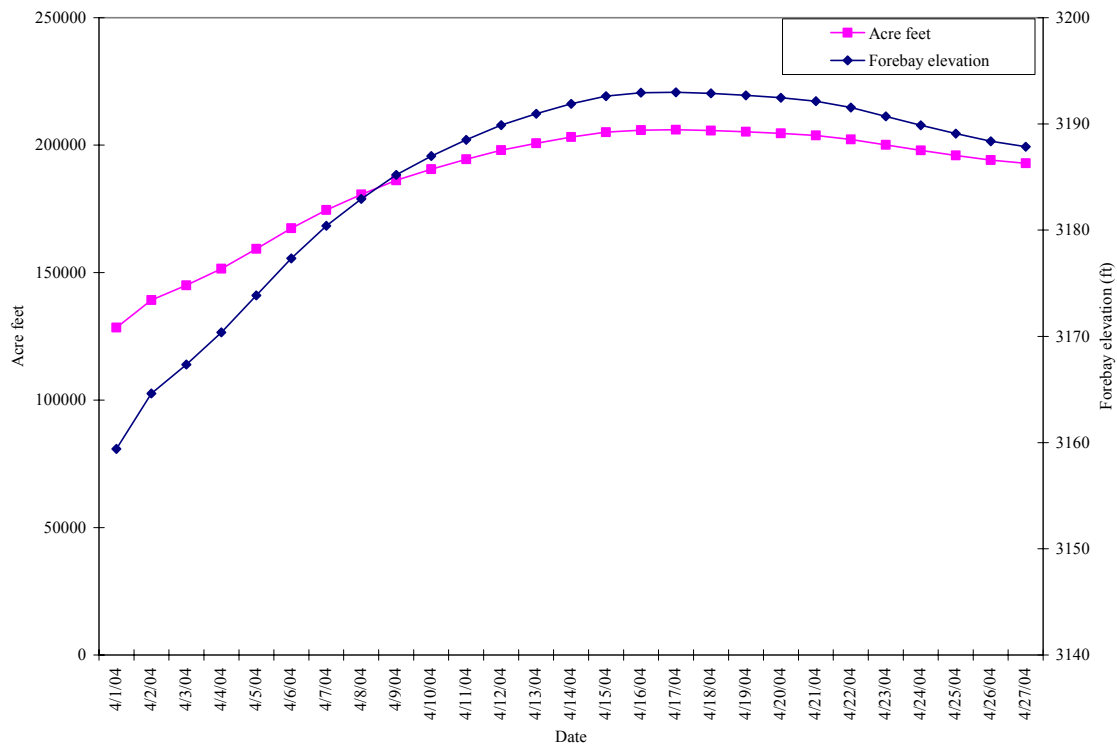


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of April 2004.

The radio tagged bull trout continue to be active during the month of April as temperatures continue to warm and stream flows have remained higher. Five fish are in the Middle Fork Boise River upstream of Arrowrock Reservoir, one of these fish is already at the mouth of Black Warrior Creek on the Middle Fork. One fish has moved up to Flicker Creek on the North Fork Boise River, one is at Troutdale, and two are near Twin Springs (Figure 2).

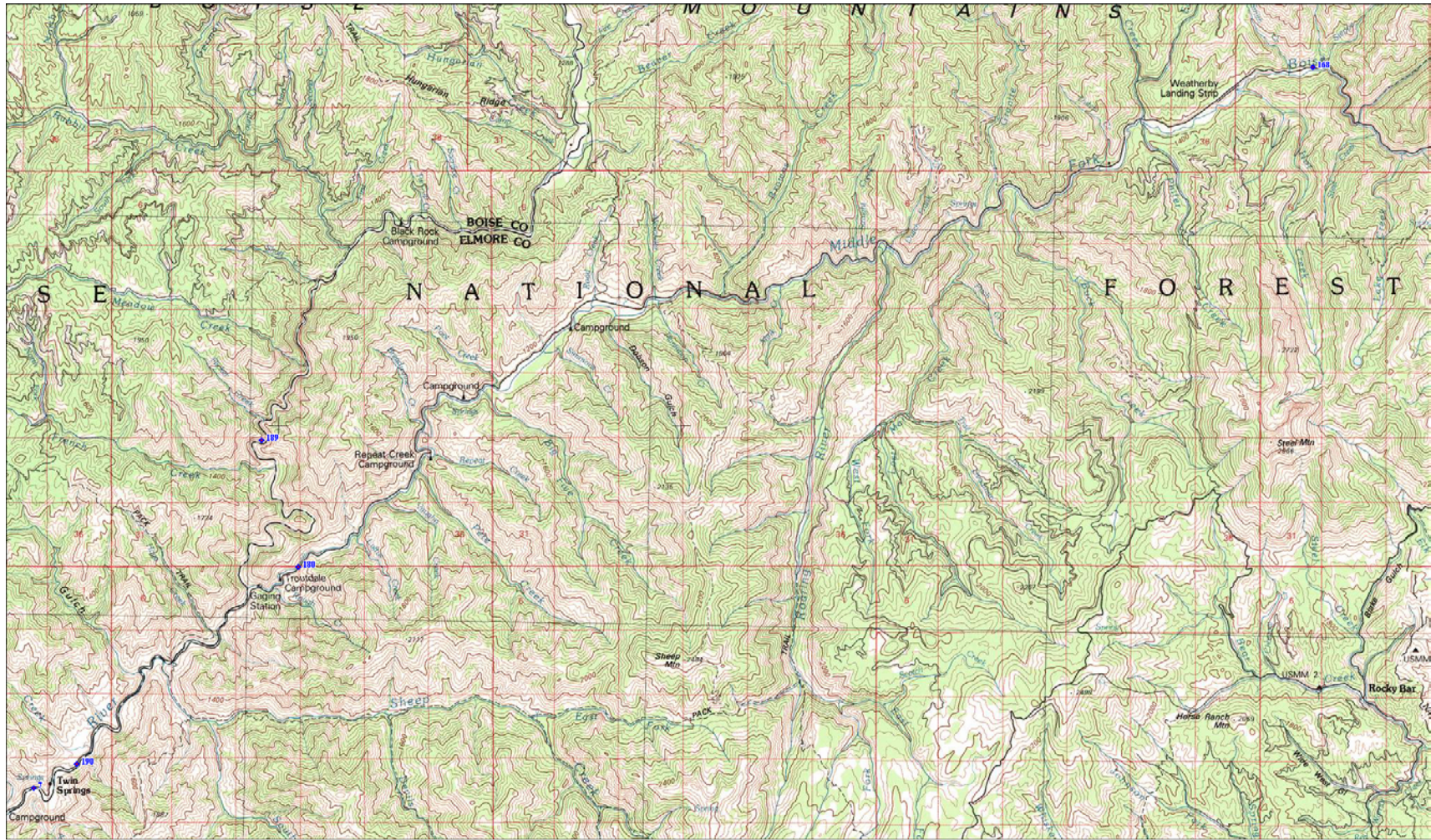


Figure 2. Locations of bull trout that have moved upstream into the Middle Fork and North Fork Boise Rivers (fish Identification and location are show in blue).

Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, seven fish have become entrained from the 2003 tagged sample (six large and one small fish; 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 11.3 % for large fish and 12.3 %. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year. We did not locate one of the entrained fish with active tags this period: 1-44 (we expect this fish has been killed as its mortality sensor was triggered in late November and the fish did not move after that time). The five fish that were found have been actively moving throughout Lucky Peak Reservoir, using the mouths of Charcoal and Mores creeks and Browns Gulch. One fish has moved upstream into the river section of Mores Creek and was found 2 miles downstream of Dunnigan Creek near Voquelin Gulch.

Bull Trout in Arrowrock Reservoir (currently inundated)

We tracked 19 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

South Fork Boise River –14 radio tags (2-71, 5-184, 2-72, 2-63, 1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 2-177). Fish in the South Fork continue to be actively moving within the river. Six fish moved from the residual pool into areas in the South Fork during the month of March and have remained near those areas. Two fish have recently moved out of the South Fork and have not been tracked (5-197 and 5-199). We suspect they may have entered the reservoir pool. Fish 1-47 and 2-5 continue to be the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 5 radio tags (5-190, 5-180, 5-189, 2-7, and 1-168). One fish had moved from the confluence of the Middle and North Fork Boise Rivers to Black Warrior Creek on the Middle Fork Boise River. One fish is at Flicker Creek on the North Fork Boise River, one at troutdale, and two are near Twin Springs (Figure 2).

Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

Lucky Peak Reservoir Trap and Transport Effort

We have captured and moved three bull trout during 106.5 hours of netting in the month of April, two smaller bull trout (350 mm TL) and one relatively large fish (560 mm TL). All three fish were in excellent condition and none were recaptured fish.

Projected work into May

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area

once per week. We will continue trapping bull trout entrained into Lucky Peak reservoir and moving them to Arrowrock reservoir.

End of May Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 5/1/04 through 5/28/04)

One fish was confirmed as mortality by raptor predation during this reporting period. Releases from Arrowrock Dam were increased in April to provide irrigation water and begin filling Lucky Peak for recreation. March and April were both very dry and warm months and left us with reduced snow pack and water levels. Snow melt run-off is rapidly declining. The Boise projects are currently at 82% of their capacity; most of the projects have reached their maximum volume or are beginning to drain for 2004. Water levels in Arrowrock Reservoir have been declining through May as Lucky Peak Reservoir was being filled for recreation (Figure 1). Releases from Arrowrock Dam were reduced on 5/26/04 though as Lucky Peak attained maximum volume. However, the reservoir will continue to be drawn down until it reaches the conservation pool. Lucky Peak Reservoir is anticipated to begin draw down the first part of August due to low water levels in the basin.

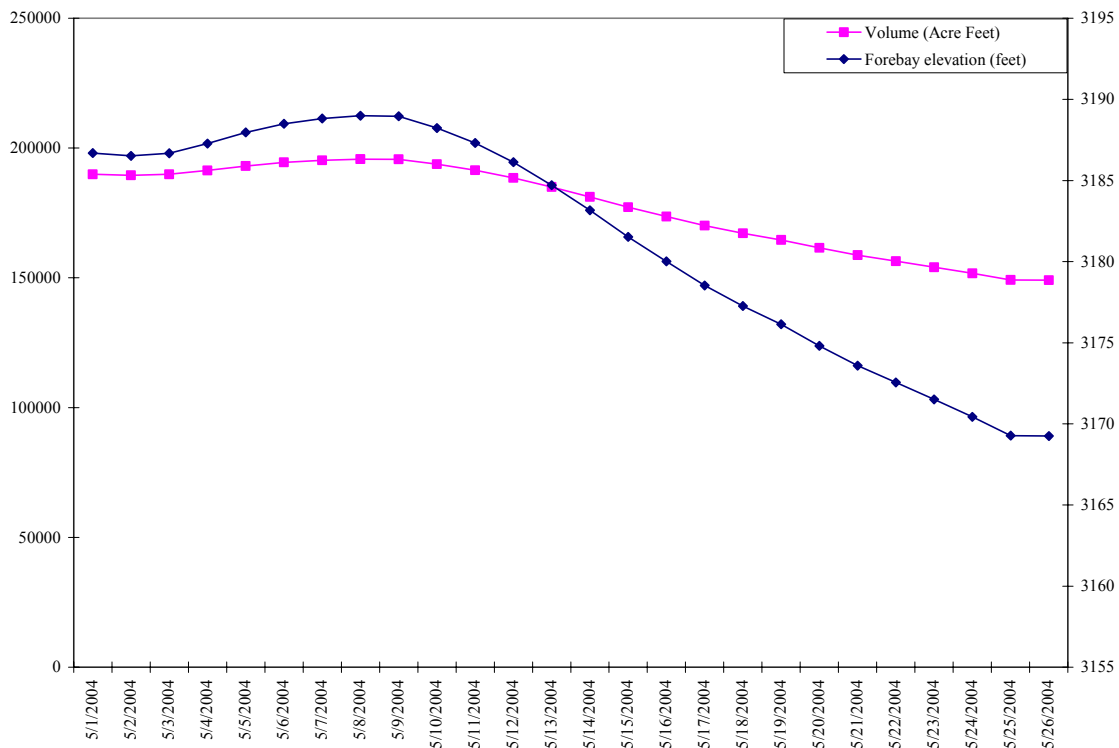


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of May 2004.

The radio tagged bull trout continue to be active during the month of May as water temperatures and stream flows vacillated (Figure 2). Six fish remain in the Middle Fork Boise River upstream of Arrowrock Reservoir. We released two radio tagged bull trout captured in Lucky Peak Reservoir into Arrowrock Reservoir in late May. They both moved upstream to Willow Creek campground within days of their release.

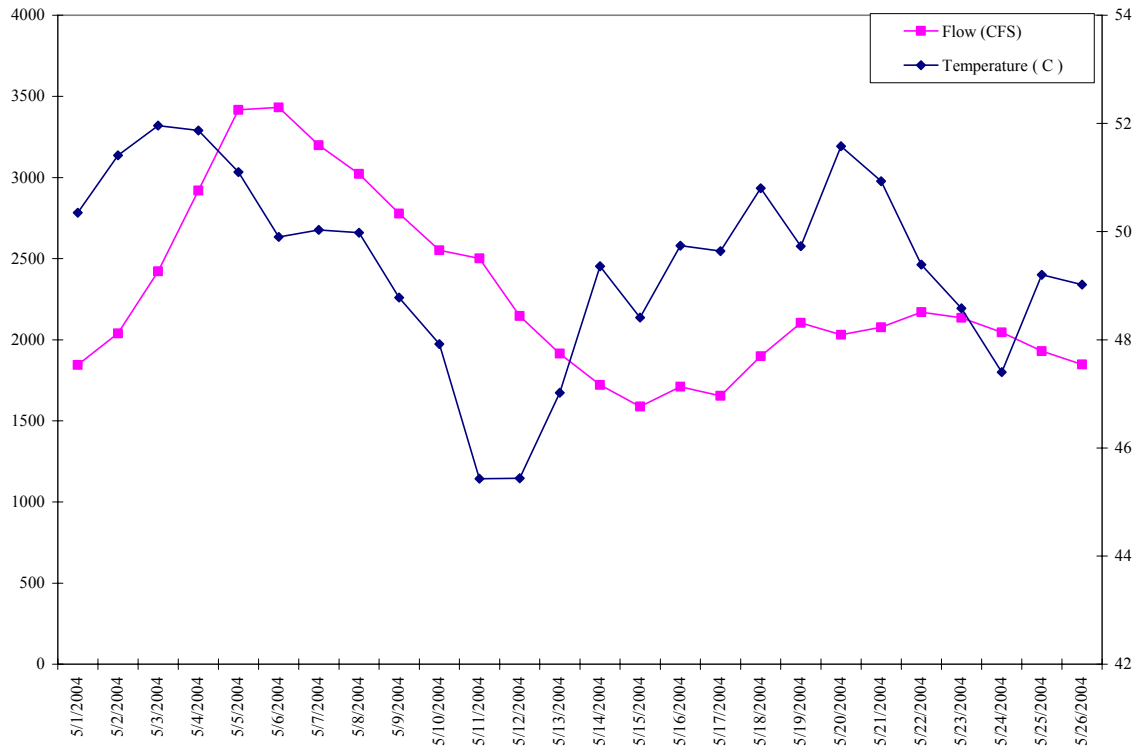


Figure 2. Mean daily water temperature (degrees Farenheit) and stream flow (ft³/s) of the Middle Fork Boise River at Twin Springs gauging station.

We had some very interesting and somewhat depressing movement from the fish that were residing in the Middle Fork Boise River upstream of Arrowrock Reservoir in April. One of these fish had moved up to Meadow Creek in the North Fork Boise River, turned around and returned to the reservoir. We estimate the fish may have been in the reservoir for a few days before it was taken by a red-tailed hawk (tag found 100 m from active nest in Grouse Creek arm). Of the remaining four fish, one remains moving from Black Warrior Creek to Weatherby landing strip in the Middle Fork, two are in the North Fork Boise River below Barber Flats and one has remained downstream from Willow Creek campground.

Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, seven fish have become entrained from the 2003 tagged sample (six large and one small fish; 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 11.3 % for large fish and 12.3 % for all tagged fish. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year. Our catch rates in Lucky Peak Reservoir have nearly doubled from 2003 rates, which adds support to the increased estimate of entrainment between the two years. Entrainment rates were expected to increase during the draw down of Arrowrock Reservoir for the construction this past winter.

There remain three fish with active radio tags moving throughout Lucky Peak Reservoir, one has been using the mouth of Charcoal Creek and another has been near the mouth of Mores Creek near the Highway 21 bridge. One fish has been tracked near Charcoal Creek and Arrowrock Dam periodically throughout the month, but was missing during our last flight of the month and has not appeared on the logger at Arrowrock Dam for over two weeks. It had last appeared immediately below Arrowrock Dam in mid-May.

Bull Trout in Arrowrock Reservoir (currently inundated)

We tracked 15 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

South Fork Boise River – 15 radio tags (2-71, 5-184, 2-72, 2-63, 1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 2-177, 5-179, 5-199). Fish in the South Fork continue to be actively moving within the river. Several of the fish have moved downstream; however these movements were rather short distances (2.5 km or less). Six fish moved from the residual pool into areas in the South Fork during the month of March and have remained near those areas. We found one fish that had not been tracked since it was tagged and we suspect the tag is faulty as the fish was very difficult to track and we were only able to get the tag to code once (5-179). One fish recently moved out of the South Fork and has not been tracked this month (5-197). We suspect it may have entered the reservoir pool. Fish 2-5 continues to be the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 6 radio tags remain (5-190 (mortality, retrieved 5/27/04), 5-180, 5-189, 2-7, 1-49, 5-164 and 1-168). Fish 1-168 moved between Black Warrior Creek and Weatherby landing strip on the Middle Fork Boise River several times this month. One fish is at Meadow Creek on the North Fork Boise River (5-189), one has moved up near Barber Flats (5-180), and three are near Willow Creek Campground (2-7, 1-49, 5-164).

Mortalities/Tag Expulsions within Arrowrock Reservoir

We had one documented mortality this month. Fish tag 5-190 was found 100 m down a hillside from a red-tailed hawk nest near Grouse Creek.

Lucky Peak Reservoir Trap and Transport Effort

We captured and moved 16 bull trout during 132.3 hours of netting (0.12 fish per hour) in the month of May. Ten of these fish were smaller bull trout (< 281 mm to 385 mm TL) and six were relatively large fish (416 mm to 582 mm TL). Most fish were in excellent condition (larger fish tended to be scarred) and four were recaptured fish.

We recaptured three of the radio tagged entrained fish this month, two with active tags. Fish 1-44 (we had previously expected this fish had been killed as its mortality

sensor was triggered in late November and the tag did not move after that time) was recaptured the first week of May. The fish had expelled its tag, probably being injured during entrainment. This fish still grew 20 mm in length and gain ~600 g in weight since tagging in the fall. Fish 5-164 was recaptured in late May, and was in very poor condition (expected for this extremely active animal). This was the fish that was rarely ever found in the same place between weekly tracking events and migrated up to the Grimes Creek confluence in Mores Creek in early May. Its weight and length did not change much from tagging. Fish 1-49 was recaptured in late May as well. I had several scars from recent raptor attacks, but still had grown 16 mm TL and gained ~ 300 g in weight.

Projected work into June

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week. We will continue trapping bull trout entrained into Lucky Peak reservoir and moving them to Arrowrock reservoir through mid-June. We start our Deadwood River and Boise River migration corridor and rearing habitat telemetry and survey work in the end of June and continue this into July.